AMENDMENTS TO THE CLAIMS

Please amend claim 235 as set forth below. This listing of claims will replace all prior versions, and listings, of claims in the application.

1-55. (Cancelled)

56. (Original) A method of forming a radio frequency ("RF") device including at least one MEMS device comprising the steps of:

fabricating a first module from a first plurality of low-temperature co-fired ceramic ("LTCC") layers, the first plurality of layers forming at least a first circuit used in the operation of the MEMS device;

fabricating a second module from a second plurality of low-temperature co-fired ceramic ("LTCC") layers, the second plurality of layers forming at least a second circuit used in the operation of the MEMS device;

polishing a surface of a front layer of the first module to be used as a substrate after fabrication of the first module is completed;

fabricating on the front layer the at least one MEMS device using MEMS processing; and

bonding the first and second modules together to thereby form a cavity containing the at least one MEMS device.

57. (Original) The method of forming a RF device as recited in claim 56 further comprising the steps of polishing a surface of a back layer of the second module to be used as a cover after fabrication of the second module is completed and applying two-component brazing materials on the front and back layers prior to bonding the first and second modules together.

58. (Original) The method of forming a RF device as recited in claim 56 wherein the step of bonding the first and second modules together is performed using eutectic bonding.

59. (Original) The method of forming a RF device as recited in claim 56 wherein the step of bonding the first and second modules together is performed using an insulating layer such as glass-frit.

60. (Original) The method of forming a RF device as recited in claim 56 wherein the step of bonding the first and second modules together is performed using an insulating layers such as a thermalsetting polyimide film.

61. (Original) The method of forming a RF device as recited in claim 56 wherein the step of applying two-component brazing materials on the front and back layers comprises the steps of:

depositing a plurality of first contact pads on a front layer of the first module;

planarizing the front layer of the first module;

depositing an adhesion layer and a soldering conductor on the first contact pads;

firing the first module at a temperature greater than 800° C;

depositing a plurality of second contact pads on a back layer of the second module;

planarizing the back layer of the second module;

depositing an adhesion layer and a soldering conductor on the second contact pads; and

firing the first module at a temperature greater than 800° C.

62. (Original) The method of forming a RF device as recited in claim 56 wherein the step of polishing the surfaces of the front and back layers is performed using a mechanical or chemical/mechanical polish.

63. (Original) The method of forming a RF device as recited in claim 57 wherein the step of polishing the surfaces of the front and back layers is performed using a mechanical or chemical/mechanical polish.

64. (Original) The method of forming a RF device as recited in claim 56 wherein the step of bonding the first and second modules together is performed at low pressure and in a low-humidity environment.

65. (Original) The method of forming a RF device as recited in claim 56 wherein the step of bonding the first and second modules together is performed in an inert gas atmosphere.

66. (Original) The method of forming a RF device as recited in claim 56 wherein the first and second modules are bonded together to thereby form a hermetically sealed cavity containing the at least one MEMS device.

67. (Original) The method of forming a RF device as recited in claim 56 wherein the step of fabricating the MEMS device comprises forming a switch.

68. (Original) The method of forming a RF device as recited in claim 56 further comprising the step of forming vertical interconnects extending through the first and second pluralities of LTCC layers.

69. (Original) The method of forming a RF device as recited in claim 56 further comprising the step of forming in the first plurality of LTCC layers a buffer layer that is a substrate on which the at least one MEMS device is fabricated.

70. (Original) The method of forming a RF device as recited in claim 56 further comprising the step of bonding to one of the first plurality of LTCC layers at least one integrated circuit.

71. (Original) The method of forming a RF device as recited in claim 70 further comprising the step of forming in the first plurality of LTCC layers an interconnect layer for interconnecting the integrated circuit to the MEMS device.

72. (Original) The method of forming a RF device as recited in claim 56 further comprising the step of fabricating in the first plurality of LTCC layers a plurality of buried-in discrete components.

73. (Original) The method of forming a RF device as recited in claim 72 wherein the discrete components include at least one device from the group consisting of resistors, capacitors and inductors.

74. (Original) The method of forming a RF device as recited in claim 56 further comprising the step of forming in the first and second pluralities of LTCC layers screen-printed buried metal patterns that are used to define interconnections and passive microwave devices.

75. (Original) The method of forming a RF device as recited in claim 74 wherein the passive microwave devices include at least one device from the group consisting of transmission lines, couplers, and dividers.

76. (Original) The method of forming a RF device as recited in claim 56 further comprising the step of forming in the first and second pluralities of LTCC layers photo-patterned buried metal patterns that are used to define interconnections and passive microwave devices.

77. (Original) The method of forming a RF device as recited in claim 76 wherein the passive microwave devices include at least one device from the group consisting of transmission lines, couplers, and dividers.

78. (Original) The method of forming a RF device as recited in claim 56 further comprising the step of forming in the second plurality of LTCC layers ground shielding extending through said layers to shield the at least one MEMS device from radiating.

79. (Original) The method of forming a RF device as recited in claim 70 further comprising the step of flip-chip bonding the integrated circuits to screen-printed surface metal patterns on a layer of the first plurality of LTCC layers.

80. (Original) The method of forming a RF device as recited in claim 70 further comprising the step of wire-bonding the integrated circuits to screen-printed surface metal patterns on a layer of the first plurality of LTCC layers.

81. (Original) The method of forming a RF device as recited in claim 70 further comprising the step of flip-chip bonding the integrated circuits to photo-patterned surface metal patterns on a layer of the first plurality of LTCC layers.

82. (Original) The method of forming a RF device as recited in claim 70 further comprising the step of wire-bonding the integrated circuits to photo-patterned surface metal patterns on a layer of the first plurality of LTCC layers.

83. (Original) The method of forming a RF device as recited in claim 56 wherein the MEMS process is performed in large-area-processing tools or standard semiconductor tools.

84. (Original) A method of forming an electrical device comprising the steps of:

fabricating a first module from a first plurality of low-temperature co-fired ceramic ("LTCC") layers, the first plurality of layers forming at least a first circuit used in the operation of the electrical device;

fabricating a second module from a second plurality of low-temperature co-fired ceramic ("LTCC") layers, the second plurality of layers forming at least a second circuit used in the operation of the electrical device;

polishing a surface of a front layer of the first module to be used as a substrate after fabrication of the first module is completed;

fabricating on the front layer at least one microelectromechanical device ("MEMS") using standard MEMS processing; and

bonding the first and second modules together to thereby form a cavity containing the at least one MEMS device.

85. (Original) The method of forming an MEMS device as recited in claim 84 further comprising the steps of polishing a surface of a back layer of the second module to be used as a cover after fabrication of the second module is completed and applying two-component brazing materials on the front and back layers prior to bonding the first and second modules together.

86. (Original) The method of forming a MEMS device as recited in claim 84 wherein the step of bonding the first and second modules together is performed using eutectic bonding.

87. (Original) The method of forming a MEMS device as recited in claim 84 wherein the step of bonding the first and second modules together is performed using an insulating layer such as glass-frit.

88. (Original) The method of forming a MEMS device as recited in claim 84 wherein the step of bonding the first and second modules together is performed using an insulating layers such as a thermal setting polyimide film.

89. (Original) The method of forming an electrical device as recited in claim 84 wherein the step of applying two-component brazing materials on the front and back layers comprises the steps of:

depositing a plurality of first contact pads on a front layer of the first module;

planarizing the front layer of the first module;

depositing an adhesion layer and a soldering conductor on the first contact pads;

firing the first module at a temperature greater than 800° C;

depositing a plurality of second contact pads on a back layer of the second module;

planarizing the back layer of the second module;

depositing an adhesion layer and a soldering conductor on the second contact pads; and

firing the first module at a temperature greater than 800° C.

90. (Original) The method of forming an electrical device as recited in claim 84 wherein the step of polishing surfaces of the front and back layers is performed using a mechanical or chemical/mechanical polish.

91. (Original) The method of forming an electrical device as recited in claim 84 wherein the step of bonding the first and second modules together is performed at low pressure and in a low-humidity environment.

92. (Original) The method of forming an electrical device as recited in claim 84 wherein the first and second modules are bonded together to thereby form a hermetically sealed cavity containing the at least one MEMS device.

93. (Original) The method of forming an electrical device as recited in claim 84 further comprising the step of forming vertical interconnects extending through the first and second pluralities of LTCC layers.

94. (Original) The method of forming an electrical device as recited in claim 84 further comprising the step of bonding to one of the first plurality of LTCC layers at least one integrated circuit.

95. (Original) The method of forming an electrical device as recited in claim 94 further comprising the step of forming in the first plurality of LTCC layers an interconnect layer for interconnecting the integrated circuit to the electrical device.

96. (Original) The method of forming an electrical device as recited in claim 84 further comprising the step of fabricating in the first plurality of LTCC layers a plurality of buried-in discrete components.

97. (Original) The method of forming an electrical device as recited in claim 93 wherein the vertical interconnects are metal-filled vias.

98. (Original) The method of forming an electrical device as recited in claim 84 wherein the MEMS process is performed in large-area-processing tools or standard semiconductor tools.

99-203. (Cancelled)

204. (Original) A method of forming a radiating element for an array antenna comprising the steps of:

fabricating a first module from a first plurality of low-temperature co-fired ceramic ("LTCC") layers, the first plurality of layers forming at least a first circuit used in the operation of the array antenna;

fabricating a second module from a second plurality of low-temperature co-fired ceramic ("LTCC") layers, the second plurality of layers forming at least a second circuit used in the operation of the array antenna;

polishing a surface of a front layer of the first module to be used as a substrate after fabrication of the first module is completed;

fabricating on the front layer at least one microelectromechanical switch ("MEMS") using MEMS processing; and

bonding the first and second modules together to thereby form a cavity containing the at least one MEMS switch.

205. (Original) The method of forming a radiating element for an array antenna as recited in claim 204 further comprising the steps of polishing a surface of a back layer of the second module to be used as a cover after fabrication of the second module is completed and applying two-component brazing materials on the front and back layers prior to bonding the first and second modules together.

206. (Original) The method of forming a radiating element for an array antenna as recited in claim 204 wherein the step of bonding the first and second modules together is performed using eutectic bonding.

207. (Original) The method of forming a radiating element for an array antenna as recited in claim 204 wherein the step of bonding the first and second modules together is performed using an insulating layer such as glass-frit.

208. (Original) The method of forming a radiating element for an array antenna as recited in claim 204 wherein the step of bonding the first and second modules together is performed using an insulating layers such as a thermalsetting polyimide film.

209. (Original) The method of forming a radiating element for an array antenna as recited in claim 204 wherein the step of applying two-component brazing materials on the front and back layers comprises the steps of:

depositing a plurality of first contact pads on a front layer of the first module;

planarizing the front layer of the first module;

depositing an adhesion layer and a soldering conductor on the first contact pads;

firing the first module at a temperature greater than 800° C;

depositing a plurality of second contact pads on a back layer of the second module;

planarizing the back layer of the second module; (optional)

depositing an adhesion layer and a soldering conductor on the second contact pads; and

firing the first module at a temperature greater than 800° C.

210. (Original) The method of forming a radiating element for an array antenna as recited in claim 204 wherein the step of polishing the surfaces of the front and back layers is performed using a mechanical or chemical/mechanical polish.

211. (Original) The method of forming a radiating element for an array antenna as recited in claim 205 wherein the step of polishing the surfaces of the front and back layers is performed using a mechanical or chemical/mechanical polish.

212. (Original) The method of forming a radiating element for an array antenna as recited in claim 204 wherein the step of bonding the first and second modules together is performed at low pressure and in a low-humidity environment.

213. (Original) The method of forming a radiating element for an array antenna as recited in claim 204 wherein the step of bonding the first and second modules together is performed in an inert gas atmosphere.

214. (Original) The method of forming a radiating element for an array antenna as recited in claim 204 wherein the first and second modules are bonded together to thereby form a hermetically sealed cavity containing the at least one MEMS switch.

215. (Original) The method of forming a radiating element for an array antenna as recited in claim 204 wherein the MEMS switch is a phase shifter.

216. (Original) The method of forming a radiating element for an array antenna as recited in claim 204 further comprising the step of forming vertical interconnects extending through the first and second pluralities of LTCC layers.

217. (Original) The method of forming a radiating element for an array antenna as recited in claim 204 further comprising the step of forming a polarizer circuit in the second plurality of LTCC layers.

218. (Original) The method of forming a radiating element for an array antenna as recited in claim 204 further comprising the step of forming a power divider circuit and a band pass filter circuit in the first plurality of LTCC layers.

219. (Original) The method of forming a radiating element for an array antenna as recited in claim 204 further comprising the step of forming in the first plurality of LTCC layers a buffer layer that is a substrate on which the at least one MEMS phase shifter is fabricated.

220. (Previously Presented) The method of forming a radiating element for an array antenna as recited in claim 204 further comprising the step of bonding to one of the first plurality of LTCC layers at least one integrated circuit.

221. (Previously Presented) The method of forming a radiating element for an array antenna as recited in claim 220 further comprising the step of forming in the first plurality of LTCC layers an interconnect layer for interconnecting the integrated circuit to the array antenna.

222. (Previously Presented) The method of forming a radiating element for an array antenna as recited in claim 204 further comprising the step of forming in the second plurality of LTCC layers a plurality of radiating layers with at least one radiating patch fabricated on one of the radiating layers.

223. (Previously Presented) The method of forming a radiating element for an array antenna as recited in claim 204 further comprising the step of fabricating in the first plurality of LTCC layers a plurality of buried-in discrete components.

224. (Previously Presented) The method of forming a radiating element for an array antenna as recited in claim 223 wherein the discrete components are resistors, capacitors, and/or inductors.

225. (Previously Presented) The method of forming a radiating element for an array antenna as recited in claim 204 further comprising the step of forming in the first and second pluralities of LTCC layers screen-printed buried metal patterns that are used to define interconnections and passive microwave devices.

226. (Previously Presented) The method of forming a radiating element for an array antenna as recited in claim 225 wherein the passive microwave devices include at least one device from the group consisting of transmission lines, couplers, and dividers.

227. (Previously Presented) The method of forming a radiating element for an array antenna as recited in claim 204 further comprising the step of forming in the first and second pluralities of LTCC layers photo-patterned buried metal patterns that are used to define interconnections and passive microwave devices.

228. (Previously Presented) The method of forming a radiating element for an array antenna as recited in claim 227 wherein the passive microwave devices include at least one device from the group consisting of transmission lines, couplers, and dividers.

229. (Previously Presented) The method of forming a radiating element for an array antenna as recited in claim 212 further comprising the step of forming in the second plurality of LTCC layers ground shielding extending through said layers to shield the at least one radiating patch from radiating patches in other array antennas.

230. (Previously Presented) The method of forming a radiating element for an array antenna as recited in claim 221 further comprising the step of flip-chip bonding the integrated circuits to screen-printed surface metal patterns on a layer of the first plurality of LTCC layers.

231. (Previously Presented) The method of forming a radiating element for an array antenna as recited in claim 221 further comprising the step of wire-bonding the integrated circuits to screen-printed surface metal patterns on a layer of the first plurality of LTCC layers.

232. (Previously Presented) The method of forming a radiating element for an array antenna as recited in claim 221 further comprising the step of flip-chip bonding the integrated circuits to photo-patterned surface metal patterns on a layer of the first plurality of LTCC layers.

233. (Previously Presented) The method of forming a radiating element for an array antenna as recited in claim 221 further comprising the step of wire-bonding the integrated circuits to photo-patterned surface metal patterns on a layer of the first plurality of LTCC layers.

234. (Previously Presented) The method of forming a radiating element for an array antenna as recited in claim 204 wherein the MEMS process is performed in large-area-processing tools or standard semiconductor tools.

235. (Currently Amended) A method of forming an array antenna comprising the steps of:

fabricating a plurality of radiating elements, each of the radiating elements being fabricated by forming at least one microelectromechanical ("MEMS") switch on a first low-temperature co-fired ceramic ("LTCC") module, and bonding a second LTCC ~~bonded~~ module to

the first LTCC module, whereby the MEMS switch is located in a cavity between the first and second LTCC modules;

forming a plurality of sub-array modules, each of the sub-array modules being formed from a plurality of radiating elements;

integrating the plurality of sub-array modules together to form the phased array antenna; and

connecting the plurality of sub-array modules to at least one amplifier.

236. (Previously Presented) A method of forming an electrical device comprising the steps of:

fabricating a first module from a first plurality of low-temperature co-fired ceramic ("LTCC") layers, the first plurality of layers forming at least a first circuit used in the operation of the electrical device;

fabricating a second module from a second plurality of low-temperature co-fired ceramic ("LTCC") layers, the second plurality of layers forming at least a second circuit used in the operation of the electrical device;

polishing a surface of a front layer of the first module to be used as a substrate after fabrication of the first module is completed;

fabricating on the front layer at least one microelectromechanical device ("MEMS") using standard MEMS processing; and

bonding the first and second modules together to thereby form a cavity containing the at least one MEMS device.

237. (Previously Presented) The method of forming an array antenna as recited in claim 236 further comprising the steps of polishing a surface of a back layer of the second module to be used as a cover after fabrication of the second module is completed and applying two-component brazing materials on the front and back layers prior to bonding the first and second modules together.

238. (Previously Presented) The method of forming an array antenna as recited in claim 236 wherein the step of bonding the first and second modules together is performed using eutectic bonding.

239. (Previously Presented) The method of forming an array antenna as recited in claim 236 wherein the step of bonding the first and second modules together is performed using an insulating layer such as glass-frit.

240. (Previously Presented) The method of forming an array antenna as recited in claim 236 wherein the step of bonding the first and second modules together is performed using an insulating layers such as a thermal setting polyimide film.

241. (Previously Presented) The method of forming an electrical device as recited in claim 236 wherein the step of applying two-component brazing materials on the front and back layers comprises the steps of:

depositing a plurality of first contact pads on a front layer of the first module;

planarizing the front layer of the first module;

depositing an adhesion layer and a soldering conductor on the first contact pads;

firing the first module at a temperature greater than 800° C;

depositing a plurality of second contact pads on a back layer of the second module;

planarizing the back layer of the second module;

depositing an adhesion layer and a soldering conductor on the second contact pads; and

firing the first module at a temperature greater than 800° C.

242. (Previously Presented) The method of forming an electrical device as recited in claim 236 wherein the step of polishing surfaces of the front and back layers is performed using a mechanical or chemical/mechanical polish.

243. (Previously Presented) The method of forming an electrical device as recited in claim 236 wherein the step of bonding the first and second modules together is performed at low pressure and in a low-humidity environment.

244. (Previously Presemted) The method of forming an electrical device as recited in claim 236 wherein the first and second modules are bonded together to thereby form a hermetically sealed cavity containing the at least one MEMS device.

245. (Previously Presented) The method of forming an electrical device as recited in claim 236 further comprising the step of forming vertical interconnects extending through the first and second pluralities of LTCC layers.

246. (Previously Presented) The method of forming an electrical device as recited in claim 236 further comprising the step of bonding to one of the first plurality of LTCC layers at least one integrated circuit.

247. (Previously Presented) The method of forming an electrical device as recited in claim 246 further comprising the step of forming in the first plurality of LTCC layers an interconnect layer for interconnecting the integrated circuit to the electrical device.

248. (Previously Presented) The method of forming an electrical device as recited in claim 236 further comprising the step of fabricating in the first plurality of LTCC layers a plurality of buried-in discrete components.

249. (Previously Presented) The method of forming an electrical device as recited in claim 245 wherein the vertical interconnects are metal-filled vias.

250. (Previously Presented) The method of forming an electrical device as recited in claim 236 wherein the MEMS process is performed in large-area-processing tools or standard semiconductor tools.

251. (Previously Presented) The method of forming a radiating element for an array antenna as recited in claim 209 wherein the step of polishing the surfaces of the front and back layers is performed using a selectively protective and removable layer on exposed metal during polishing to prevent or reduce dishing.

252. (Previously Presented) The method of forming a radiating element for an array antenna as recited in claim 228 wherein the at least one MEMS switch contained in the hermetically sealed cavity is coated with a surface treatment to prevent stiction.

253. (Previously Presented) The method of forming a radiating element for an array antenna as recited in claim 252 wherein the at least one MEMS switch is coated with a surface treatment selected from the group consisting of dichlorodimethylsilane (DDMS) monolayer and octadecyltrichlorosilane (OTS) self-assembled monolayer.

254. (Previously Presented) The method of forming a radiating element for an array antenna as recited in claim 204 wherein the at least one MEMS switch is sealed with a surface treatment to prevent stiction.

255. (Previously Presented) The method of forming a radiating element for an array antenna as recited in claim 204 wherein the at least one MEMS switch is sealed with a surface treatment to prevent stiction and maintain low-resistance contacts in the at least one MEMS switch by avoiding contamination and unwanted chemical reactions, such as oxidation.

256. (Previously Presented) The method of forming a radiating element for an array antenna as recited in claim 254 wherein the at least one MEMS switch is sealed with a surface treatment selected from the group consisting of dichlorodimethylsilane (DDMS) monolayer and octadecyltrichlorosilane (OTS) self-assembled monolayer.

257. (Previously Presented) The method of forming a radiating element for an array antenna as recited in claim 254 wherein the at least one MEMS switch is sealed with a product that can be used on metal surfaces to minimize unintentional adhesion in mechanical switches or other contacting or near-contacting surfaces.

247-259. (Cancelled)